Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-6 (canceled)

7.(original) An apparatus for simultaneously performing multiple, independently controlled, polymerase chain reactions, comprising:

a printed circuit board having upper and lower surfaces;

said lower surface being in direct contact with a layer of electrically insulating material which is in direct contact with a heat sink;

on said upper surface, an electrically insulating layer of soft material having high thermal conductivity;

on the soft layer, an array of resistance heaters and temperature sensors;

solder bumps that extend downwards from the array and pass through said soft layer to provide electrical connections between the array and the circuit board thereby enabling each heating source to be independently controlled;

on each heater and sensor of the array, and in direct contact with the soft layer, a block having high thermal conductivity;

a chip, formed of material that is thermally insulating;

means for uniformly pressing the chip against the blocks, including surface profiles for the blocks and the chip that facilitate rapid alignment between chip and the blocks;

a layer of contact enhancing material between the chip and the blocks;

reaction chambers within said chip, at least one reaction chamber symmetrically overlying each block when the chip is pressed against the blocks; and

means for filling and emptying each chamber with reagents used in said polymerase chain reaction.

8.(original) The apparatus described in claim 7 wherein said means for uniformly pressing the chip against the blocks further comprises:

sidewalls attached to the chip, said sidewalls extending downwards from the chip by an amount such that, when the chip touches the blocks said sidewalls just contact the printed circuit board, thereby forming an airtight enclosure; and

a hole that passes through both the heat sink and the printed circuit board thereby enabling air in said enclosure to be evacuated.

9.(original) The apparatus described in claim 7 wherein said means for uniformly pressing the chip against the blocks further comprises:

a covering case, having a ceiling, that rests on the printed circuit board and that encloses both the blocks and the chip; and

extending downwards from said ceiling, rods having free ends that are pointed , each having a length such that, when the covering case rests on the circuit board, said rods press down on the chip.

10.(original) The apparatus described in claim 7 wherein said means for uniformly pressing the chip against the blocks further comprises:

a fixture that includes an additional heat sink, an additional printed circuit board, and additional blocks;

said fixture being positioned in an inverted orientation touching the chip whereby said additional heat sink, additional printed circuit board, and additional blocks are

aligned relative to said heat sink, printed circuit board, and blocks; and

an adjustable clamp that presses together the fixture, the chip, and the blocks.

11.(original) The apparatus described in claim 7 wherein said layer of electrically insulating material is selected from the group consisting of adhesives, epoxies, polymers, and grease.

12.(original) The apparatus described in claim 7 wherein said layer of soft material is selected from the group consisting of epoxies, polymers, and grease.

13.(original) The apparatus described in claim 7 wherein the blocks are made of a material selected from the group consisting of silicon, metals, and ceramics.

14.(original) The apparatus described in claim 7 wherein said layer of contact enhancing material is selected from the group consisting of polymers, rubbers, and grease.

15.(original) An apparatus for simultaneously performing multiple, independently controlled, polymerase chain reactions, comprising:

a printed circuit board having upper and lower surfaces;

said lower surface being in direct contact with a layer of electrically insulating material which is in direct contact with a heat sink;

on said upper surface, an electrically insulating layer of soft material having high thermal conductivity;

on the soft layer, an array of first blocks having high thermal conductivity

on each first block, a resistance heater and a temperature sensor;

in direct contact with each first block, a second block having high thermal

conductivity and that is smaller than the first block whereby each heater and sensor on a first block is partially covered by a second block and is partially exposed;

wires that extend downwards from the exposed portions of the heaters and sensors, that pass through the soft material to make electrical contact to the printed circuit board, thereby enabling each heating source to be independently controlled;

a chip, formed of material that is thermally insulating;

means for uniformly pressing the chip against the second blocks, there being a layer of contact enhancing material between the chip and the second blocks;

reaction chambers within said chip, at least one reaction chamber symmetrically overlying a single second block when the chip is pressed against the blocks; and

means for filling and emptying each chamber with reagents used in said polymerase chain reaction.

16.(original) The apparatus described in claim 15 wherein said means for uniformly pressing the chip against the blocks further comprises:

sidewalls attached to the chip, said sidewalls extending downwards from the chip by an amount such that, when the chip touches the blocks said sidewalls just contact the printed circuit board, thereby forming an airtight enclosure; and

a hole that passes through both the heat sink and the printed circuit board thereby enabling air in said enclosure to be evacuated.

17.(original) The apparatus described in claim 15 wherein said means for uniformly pressing the chip against the blocks further comprises:

a covering case, having a ceiling, that rests on the printed circuit board and that encloses both the blocks and the chip; and

extending downwards from said ceiling, rods having free ends that are pointed , each having a length such that, when the covering case rests on the circuit board, said

rods press down on the chip.

18.(original) The apparatus described in claim 15 wherein said means for uniformly pressing the chip against the blocks further comprises:

a fixture that includes an additional heat sink, an additional printed circuit board, and additional blocks;

said fixture being positioned in an inverted orientation touching the chip whereby said additional heat sink, additional printed circuit board, and additional blocks are aligned relative to said heat sink, printed circuit board, and blocks; and

an adjustable clamp that presses together the fixture, the chip, and the blocks.

19-26 (canceled)

27.(previously presented) A process for simultaneously performing multiple, independently controlled, chemical reactions, comprising:

providing, on a heat sink, a printed circuit board on which is an array of blocks, said blocks having high thermal conductivity;

providing an array of reaction chambers in a chip formed of material having low thermal conductivity;

filling each reaction chamber with reagents necessary for said chemical reaction and then pressing the chip against the blocks, in a manner such that at least one reaction chamber symmetrically overlies a single block;

attaching sidewalls to the chip, said sidewalls extending downwards from the chip by an amount such that, when the chip touches the blocks said sidewalls just contact the printed circuit board, thereby forming an airtight enclosure;

evacuating the enclosure through a hole that passes through both the heat sink and the printed circuit board; and

independently heating each block that is overlaid by a filled reaction chamber whereby the reagents in each chamber are maintained at a constant and uniform temperature for a time period, said temperature and time period being independently adjustable for each chamber.

28.(previously presented) A process for simultaneously performing multiple, independently controlled, chemical reactions, comprising:

providing, on a heat sink, a printed circuit board on which is an array of blocks, said blocks having high thermal conductivity;

providing an array of reaction chambers in a chip formed of material having low thermal conductivity;

filling each reaction chamber with reagents necessary for said chemical reaction and then pressing the chip against the blocks, in a manner such that at least one reaction chamber symmetrically overlies a single block;

providing a covering case, having a ceiling, that rests on the printed circuit board and that encloses both the blocks and the chip;

providing rods that extend downwards from said ceiling, each rod having a free end that is pointed and a length such that, when the covering case rests on the circuit board, said rods press down on the chip;

placing the covering case on the circuit board thereby causing said rods to press the chip against the blocks; and

independently heating each block that is overlaid by a filled reaction chamber whereby the reagents in each chamber are maintained at a constant and uniform temperature for a time period, said temperature and time period being independently adjustable for each chamber.

29.(previously presented) A process for simultaneously performing multiple,

independently controlled, chemical reactions, comprising:

providing, on a heat sink, a printed circuit board on which is an array of blocks, said blocks having high thermal conductivity;

providing an array of reaction chambers in a chip formed of material having low thermal conductivity;

filling each reaction chamber with reagents necessary for said chemical reaction and then pressing the chip against the blocks, in a manner such that at least one reaction chamber symmetrically overlies a single block;

providing a fixture that includes an additional heat sink, an additional printed circuit board, and additional blocks;

positioning said fixture in an inverted orientation to touch the chip with said additional heat sink, additional printed circuit board, and additional blocks being aligned relative to said heat sink, printed circuit board, and blocks;

using an adjustable clamp, pressing together the fixture, the chip, and the blocks; and

independently heating each block that is overlaid by a filled reaction chamber whereby the reagents in each chamber are maintained at a constant and uniform temperature for a time period, said temperature and time period being independently adjustable for each chamber.